FLEXIBLE CONNECTIONS

A Call for Evidence

29/06/2023

Contents

1. INTRODUCTION

As society decarbonises and the needs of our customers evolve, NIE Networks is developing our network for the future. In our RP7 business plan we set out how we expect to ensure the network is fit for the future and we emphasise the role of customer flexibility in delivering an adequate and optimised but lowest cost network. In our updated innovation strategy, we acknowledge the need to consider doing things differently.

Alongside our emerging market for customer flexibility in terms of energy imported from or exported to the network, in this paper we consider options for flexibility in terms of connecting to the network.

Traditionally, when our customers have needed a connection to the network, we have provided a connection agreement which includes a single figure for Maximum Import Capacity and a single figure for Maximum Export Capacity (one of which might be zero). This has provided a continuous capability for the customer to import or export up to that quantity, every hour of every day of the year. We have then designed our network to provide for all customers on a part of the network to use all their import (or export) capacity at the same time. (Except for the local Low Voltage network supplying households, where we consider demand after the effect of diversity.)

But we know many of our customers do not need to import or export at the same level continuously. For example: a factory might have higher demand in daytime working hours; a transport hub might charge public transportation overnight; a renewable generator might only generate when the weather is suitable.

This means that, although we have designed and operated our network in accordance with the applicable standards (see section 9), there are periods of time when the network is not fully utilised.

In our 2020 decision paper on MIC charging methodology[1] we noted:

> *There are approximately 5,300 customers connected to the distribution network with a contracted Maximum Import Capacity (MIC) capacity greater than 70kVA …. However, the MIC for these customers was established at the time of connecting their new electrical load and therefore the MIC must be reserved by NIE Networks when designing the network for existing and new capacity. Of the total number of >70kVA demand customers connected, approximately 4,750 have an aggregated demand circa 600MVA lower that the contracted MIC figure. This is a substantial level of unused capacity on the distribution network which results in expensive and in many cases, unnecessary reinforcement to facilitate the connection of new load.*

In that paper we introduced a charge for the MIC held by customers (depending on the tariff, alongside a standing charge and rate per unit of consumption).

In the same paper we concluded:

> *This will deal with NIE Networks obligation to address the underutilisation of the network and the potential for unnecessary reinforcement being charged to new connectees. NIE Networks considers the measures appropriate to release capacity being persistently underused. The actions to be taken will free up capacity on the existing network infrastructure to allow future customers to connect without incurring high and sometimes unnecessary reinforcement charges.*

We are now considering how we might be able to offer customers more flexible connections, how customers might benefit from such arrangements and how the costs of developing the network in line with customer needs can be minimised by employing such arrangements.

In this paper we:

- describe what we mean by flexible connections and some different forms of flexible connection;
- consider the impact of flexible connections on systems, including systems operated by NIE Networks, SONI, suppliers, wholesale and system services market operators; and

[1] Decision on MIC Charging Methodology - Decision Paper, 17/09/2020.

- seek the views of customers and other stakeholders on the opportunities and efficiencies that might be achieved by different flexible connection arrangements.

Any decision to move forward with a form of connection flexibility would be subject to a detailed cost benefit analysis by NIE Networks and regulatory engagement.

In this paper we refer to connections to the NIE Networks distribution system only, that is connections at voltages up to (and including) 33 kV across Northern Ireland.

In this paper we do not consider interactions with potential reform of the connection charging or network charging regimes.

2. DEFINITIONS

Term	Definition
Maximum Import Capacity (MIC)	Maximum Import Capacity means the maximum permissible amount of electricity to be imported from the Distribution System as set out in the Connection Agreement. (Defined in Connection Statement of Charges, below.)
Maximum Export Capacity (MEC)	Maximum Export Capacity means the maximum permissible amount of electricity to be exported to the Distribution System as set out in the Connection Agreement. (Defined in Connection Statement of Charges, below.)
DUoS Statement of Charges	More fully 'The Statement of Charges for Use of the Northern Ireland Electricity Networks Ltd Electricity Distribution System by Authorised Persons', as updated annually. Available at https://www.nienetworks.co.uk/about-us/regulation/network-charges.
Connection Statement of Charges	More fully 'Statement of Charges for Connection to the NIE Networks' Distribution System', as updated. Available at https://www.nienetworks.co.uk/statementofcharges.
standard connection	A connection with a single value for connection capacity (for each of import and export).
flexible connection	A connection with more than one Maximum Import Capacity value or more than one Maximum Export Capacity value (or both) over time.
static flexible connection	A flexible connection where the MIC/MEC values are known in advance and not subject to change (except on application).
timed static flexible	A static flexible connection where the MIC/MEC values change a small number of times during the day and are (generally) the same every day of the year. For example, day/night, day off-peak/evening peak/overnight.
profiled static flexible	A static flexible connection where the MIC/MEC values vary throughout the day and are (generally) the same every day of the year.
seasonal static flexible	A static flexible connection where the MIC/MEC values change during the year.
dynamic flexible	A connection where the capacity available to a customer varies (at least to some extent) based on the prevailing system conditions and where the capacity available to the customer is known close to real time.
active network management (ANM)	A system used to manage the capacity of a dynamic flexible connection in real time.

3. BENEFITS OF FLEXIBLE CONNECTIONS

We foresee that certain kinds of customers with predictable patterns of demand or generation, or the ability to control patterns of use, could benefit from flexible connections. Examples might include photovoltaic generators (daylight hours), transport charging (overnight) or industrial users with the ability to manage patterns of demand.

We anticipate the benefits of operating a flexible connections regime for such customers could include:

- Avoid some or all of the cost of network reinforcement for a standard connection that will not be fully utilised for periods of time, when the customer's use will not cause the network to be congested.
- Avoid the delay of waiting for network reinforcement before connecting.
- Avoid the expense of paying for network capacity in periods where the capacity is not required.

For NIE Networks, and therefore for all NI customers, benefits also include:

- More efficient use of the network, reducing costs and increasing value for all customers.
- Facilitation of connection of small scale low carbon generation or EV charging, for example, facilitating societal decarbonisation.

Question A: Do you agree with the anticipated benefits of flexible connections, as described above?

Question B: What other benefits do you identify?

Question C: What kinds of customers or assets might benefit from flexible connections?

4. TYPES OF FLEXIBLE CONNECTION

4.1 Flexible connections

In general, we refer to a connection that has an MIC or MEC which is not a single, continuous value as a flexible connection. The changes in capacity values could take a number of forms, including static and dynamic options, which we describe below.

4.2 Static flexible

A static flexible connection is a connection where changes in MIC or MEC are defined in the connection agreement and are therefore fixed ahead of real time.

4.2.1 Timed static flexible

A timed static flexible connection is a connection where MIC or MEC values change a small number of times during a day and where the same pattern of MIC or MEC values is applied every day. For example, day/night, day off-peak/evening peak/overnight.

4.2.2 Seasonal static flexible

A seasonal static flexible connection is a connection where MIC or MEC changes during the year. The rationale is that the network might be at risk of becoming congested only during certain periods, for example around the winter peak demand periods. The connection agreement might provide for a single MIC or MEC value for most of the year, except in those periods, when a different value would apply.

4.2.3 Profiled static flexible

A profiled static flexible connection is a connection where MIC or MEC changes continuously throughout the day, perhaps hourly or half-hourly and where the same pattern of MIC or MEC values is applied every day.

4.3 Dynamic flexible

A dynamic flexible connection is a connection where capacity is made available in or close to real time based on real time information about network utilisation. Available capacity (or the probability of available capacity) could be estimated ahead of real time but is not known (with certainty) long ahead of real time.

Question D: What form of flexible connection would be of most benefit to you? Why?

Question E: Are there any other forms of flexible connection that would be of value to customers?

4.4 Timing resolution

We are interested to understand what resolution would be useful for flexible connections generally. For example, static day/night values could be based on the economy 7 times for a static timed flexible connection, when customers might benefit from a lower rate for off-peak demand. More granular time bands, perhaps hourly, could be useful for a solar PV generator on a profiled static flexible connection. Greater flexibility in these connections could be achieved by half hourly resolution, aligning with the present time periods for wholesale trading.

Question F: Recognising that more granular resolution would mean greater complexity in systems, what resolution would be optimal for a flexible connection, and why?

5. CHARGING

5.1 How are customers charged today?

5.1.1 Charges for Connection

Customers connecting to the distribution network today are required to pay for any necessary reinforcement of the network up to one voltage level higher. This is set out in the 'Statement of Charges for Connection'[2]. One important feature of a flexible connection is the potential to connect a customer while potentially avoiding (part of) these reinforcement costs and the associated delay while reinforcement is delivered.

5.1.2 Charges for Use

NIE Networks' 'Statement of Charges for Use of the Distribution System'[3] sets out how distribution connected import customers are billed for their use of the distribution network. All such charges are billed to customers through their supplier. (Export is not charged.)

For example, for a large demand site distribution network charging is applied in three components:

- a standing charge, which is a single £/month charge for the connection;
- a capacity charge, which is a single £/kVA charge based on the capacity in the connection agreement; and

[2] 'Statement of Charges for Connection to the NIE Networks' Distribution System' (Current Statement of Charges for Connections)

[3] 'Statement of Charges for use of the Northern Ireland Electricity Networks Ltd Electricity Distribution System by Authorised Persons' (Statement of Charges for use of the Distribution System (DUoS))

- a unit charge, the rate of which varies depending on the season, day of the week and time of day, for each unit of electricity metered through the connection.

(Not all of these elements are charged for every tariff.)

Charges vary with voltage and distance from the source substation. A distribution loss adjustment factor (DLAF) is applied, where the DLAF is generic for a voltage level or site-specific and varies across day and night, where day and night vary between summer and winter.

5.1.3 Charges for Exceedance

One of the aims of considering flexible connections is to optimise network utilisation. As the network becomes more heavily loaded, it is increasingly important that customers' use of the network does not exceed their contracted connection capacity, their MIC or MEC.

Since October 2021 additional charges have been in place for customers who exceed their contracted import connection capacity. Schedule E of the DUoS Statement of Charges sets out MIC exception charges.

We are interested in whether these exceedance charges provide a realistic and sufficient incentive for a customer to keep use within MIC limits. As part of this discussion, we would consider other methods to ensure connection capacity is not exceeded including, for example, implementation of physical controls by the DNO/customer. (Such an approach is inherent in an Active Network Management system.)

We are considering whether and how an equivalent regime might be applied to exceedance of MEC also.

Question G: Bearing in mind the increasing importance of customers not exceeding their contracted connection capacity, do you agree with the principle that customers should be incentivised not to exceed their MIC/MEC?

Question H: Do the present exception charges for MIC provide a suitable and sufficient incentive for customers not to exceed their MIC?

Question I: Do you agree in principle that an equivalent exception charging mechanism should be established for exceedance of MEC?

Question J: Would you advocate or be willing to install physical controls on site to reinforce adherence to MIC/MEC limits?

5.2 How Might Customers be Charged in the Future?

We anticipate that a capacity charge for a flexible connection could continue to be a £/kVA charge, where the charge would take account of the multiple values of capacity. For example, if a customer held MIC at half-hourly resolution, the capacity charge would be calculated each half hour.

An alternative would be to charge for capacity based on the maximum MIC in the customer's connection agreement.

Capacity charging is today based on MIC, due to the fact that the physical network is designed and built for the peak usage by customers. In a case where many customers have flexible connections and the objective is more fully to utilise capacity on the network, this maximum load might occur at any time. Therefore, charging customers for their capacity held in each period is more likely to be cost reflective.

In combination with the exception charges for customers exceeding MIC, this incentivises in principle holding an appropriate level of connection capacity.

No further changes to the DUoS charging regime are proposed at this time, although we acknowledge the potential for wider reform of the present DUoS charging regime and that such wider reform might be necessary depending in part on our and our customers' experiences with flexible connections.

Question K: What approach to charging for MIC provides a meaningful incentive for customers to hold no more than sufficient capacity for their needs? Options: Charge for maximum MIC; charge for MIC in each period; some other approach – please describe?

6. REDUCING CONNECTION CAPACITY

Today a customer might request a reduction in capacity held in a connection agreement and benefit from lower charges for capacity. Indeed, since the charging mechanism was changed to charge based partly on capacity, about 7 % of HV and EHV customers have requested a reduction in MIC.

In the same way, one might foresee that a customer holding a standard connection agreement could request an amendment to a flexible connection agreement and thereby benefit from reduced charges for capacity at periods where lower capacity is required.

Question L: Would customers seek to move to a flexible connection in order to reduce connection capacity in certain periods and therefore reduce total network charges?

The value to a new connecting customer of avoided network reinforcement costs, which are avoided by an existing connected customer releasing unused capacity, are not fully reflected in the cost reduction to the existing customer who is releasing unused capacity. We are interested in views on whether we should more highly reward a customer's reduction in capacity (whether through a flexible connection or a standard connection) where it allows additional (new or increased) connections to avoid reinforcement charges.

Question M: Does the cost saving of moving to a flexible connection provide sufficient incentive for customers to release capacity?

7. CONNECTION CAPACITY MARKET

Considering how, in order to maximise use of the network and keep reinforcements costs down, a customer might be incentivised to hold sufficient, but no more than sufficient, capacity for their needs, we consider the possibly of flexible connections allowing customers to surrender unused capacity which might be used to connect new customers.

The concept of a customer to customer market for connection capacity provides a means for connected or not yet connected customers to transact import and export connection capacity within parameters set by the DSO. This could in principle be an economically efficient way for customers to increase or decrease connection capacities in a congested part of the network, as well as providing a locational signal and price discovery for locational connection capacity.

However, we foresee concerns about the liquidity of such a market in a very granular network and costs associated with overseeing or operating such a market. For these reasons we do not consider establishment of a market for connection capacity to be an efficient approach in the short to medium term.

Question N: Do customers think a market for connection capacity is, theoretically, a useful approach?

Question O: Do customers agree that a market for connection capacity is, in practice, unlikely to be a useful approach in the short to medium term?

Question P: Should a connection capacity market remain a consideration in the longer term?

8. NETWORK RISK

8.1 A Change of Approach

There are two approaches to managing total contracted capacity on a part of the distribution network:

1. **Deterministic**
   Manage total connected customer MIC/MEC within the capacity of the network. This is the approach used today. The difference with flexible connections is that the total needs to be managed in every period of every day (as opposed to a sum of single connection capacities per customer). This is still likely to lead to network under-utilisation as not all customers use their full contracted connection capacity continuously.

2. **Probabilistic**
   Issue connection agreements, including flexible connection agreements, to customers while taking into account real, measured network flows and use of the network by existing connected customers. This is effectively aggregating the behaviour of existing connected customers when making a connection offer to a new customer. An example is shown in Appendix B.

The second option, taking account of historical and forecast flows (in addition to aggregated MIC/MEC), is similar to the approach used on the low voltage network, where household demand is aggregated and the network is designed to accommodate After Diversity Maximum Demand.

Hereafter we assume the probabilistic approach is adopted.

8.2 The Probabilistic Approach - Risk

In Appendix B we present a very simple example where two new customers are connecting. Each of their requirements cannot be accommodated by the deterministic approach and the connections would incur costs for reinforcement. However, taking the probabilistic approach, where we see that these customers' needs can be accommodated and we have connected the two new customers with flexible MIC.

However, we have now contracted aggregated customer MIC in excess of the available capacity on the network. While we are confident that the customers' needs today can be accommodated, there is a risk that (some of) the customers increase their demand, in line with their contractual right – their contracted MIC. Then the customers' aggregated use of the network could exceed its physical capacity (in the absence of an active network management capability).

Ultimately NIE Networks needs to reinforce the network to address this growth in load, but that can take considerable time to plan and deliver. Therefore, we consider potential mitigations of this risk:

- Allowing, incentivising, encouraging customers to re-contract with a lower MIC in periods when they do not need their whole MIC. There is a question of whether customers are sufficiently incentivised to request or accept reduced MIC or to keep their use within their contracted capacity. (See questions in 6.)
- We expect that we would need to apply enhanced monitoring to that part of the network, so that we can observe trends in customer use and act early to deliver additional capacity if we forecast congestion. We are mindful that some changes in customer use are gradual, but some occur more quickly – for example, electrification of transport might be more gradual as a fleet converts, while commissioning of new equipment might cause a step change in industrial demand.
- Customer engagement can be useful, so that we learn of forthcoming changes in a customer's business - anticipating changes in demand from e.g. new plant, extended operating hours, fleet electrification, etc. - which we can take into account as we plan the network. However, there is today no obligation for customers to inform us about changing patterns of use.
- Our offer of a flexible connection could be time-limited. This would allow a customer to connect for a period of time, say 2-3 years, but if towards the end of that period we forecast increased

network utilisation we might not be able to extend that customer's flexible connection to a further period, so that it would revert to a lower level. We think this is less likely to be acceptable to a customer, since it does not provide certainty beyond the initial period, which could jeopardise project financing. On the other hand, it might provide sufficient time to investigate a particular expansion with minimal upfront network reinforcement costs.

- If we forecast growth in use of the network, there could be other tools available to manage the risk of use exceeding capacity. For example, we could procure a flexibility service as demonstrated through our FLEX innovation project.

The costs of reinforcement (or other innovative solutions) due to this demand growth would be socialised, because each customer is operating within its contracted capacity. This is in line with existing regulated investment where the impact of incremental load growth is managed through the price control processes.

Question Q: Which approach should we pursue: The 'deterministic' approach, where we keep total contracted capacity within the capacity of the network; or the 'probabilistic' approach, where we offer additional connections based on historic and forecast network flows?

Question R: Is there another approach we should explore?

9. REGULATION AND STANDARDS

NIE Networks, as the licenced network operator, is required by law to *'**develop and maintain an efficient, coordinated and economical system of electricity distribution** which has the long-term ability to meet reasonable demands for the distribution of electricity'* (our emphasis).[4]

We consider development of arrangements for flexible connections, which are inherently coordinated, have the potential to promote efficient use of the network, providing also economic gain for customers.

The Electricity Distribution Licence held by NIE Networks explicitly requires us not unduly to discriminate between any customer when offering terms and charges for connection to the network.[5] We expect flexible connections could ultimately be made available to all customers, but we would propose to roll out our approach at certain voltages, types of connection or locations, to build experience in managing such connections at small scale and understand the whole system impact.

Regarding design standards and policies, we consider these proposals on flexible connections do not necessitate any changes to the present arrangements.

In conclusion, we think there is no obstacle in the present framework of legislation, regulation, codes, standards and policies that hinders introduction of flexible connections.

However, as we roll out flexible connections, we will need to monitor any effect of higher network utilisation on asset performance and network resilience, to ensure that the resilience of the network is sustained.

Question S: With regard to the regulatory framework do you agree that no changes are required in order to connect customers with flexible connections? If not, please explain.

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[4] The Electricity (Northern Ireland) Order 1992, section 12 (1).

[5] Electricity Distribution Licence held by NIE Networks, specifically conditions 15 (Non-Discrimination), 17 (Distribution Interface Arrangements), 19 (Distribution System Security and Planning Standards and Operation of the Distribution System) and 30 (Requirement to Offer Terms for Connection to and Use of Distribution System).

10. PROPOSED PRINCIPLES FOR FLEXIBLE CONNECTIONS

Here we set out the principles behind what we propose to offer, at least in the early stages.

1. We will try to accommodate a flexible connection, on the request of an applicant, based on our knowledge of network capacity, network utilisation and other technical factors.
2. We will assess each individual connection or potential connection separately, undertaking a risk assessment before offering a flexible connection.
3. Where we enter into a flexible connection with a customer, we will apply increased monitoring of asset utilisation and increased scrutiny of asset performance.

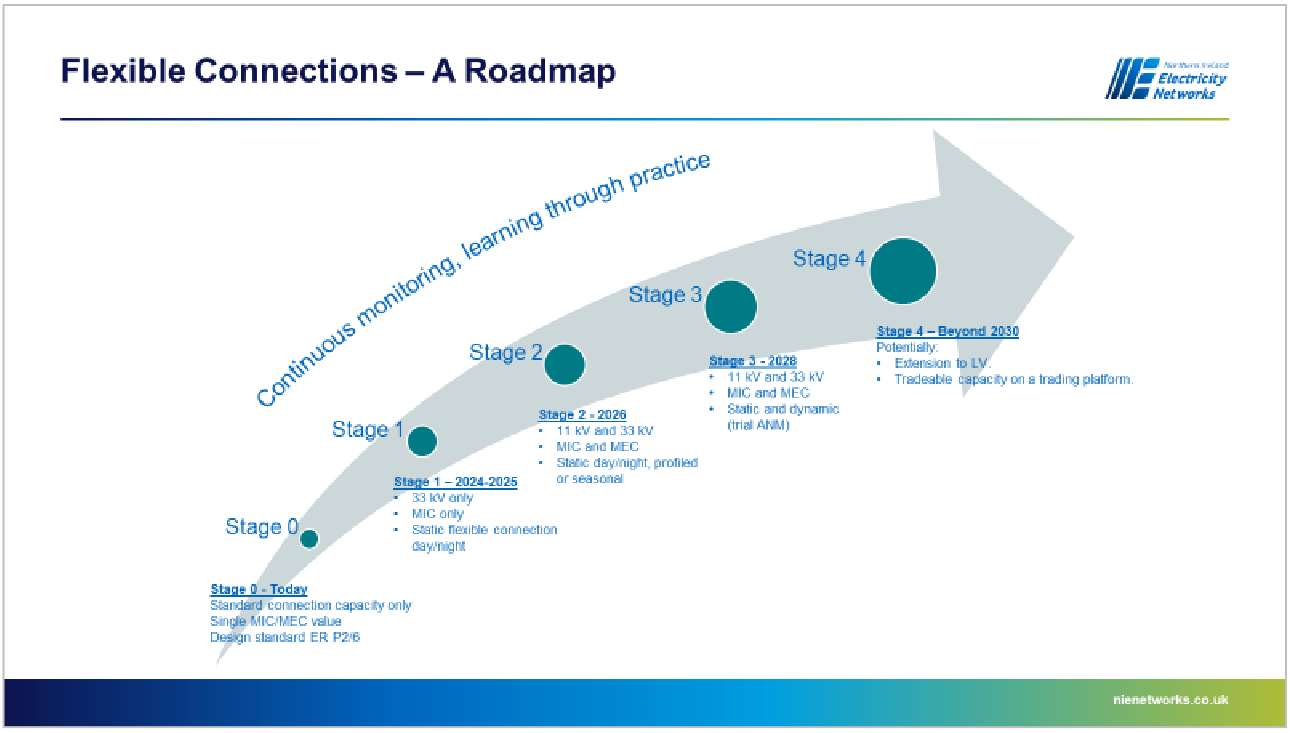
Question T: Do you agree with these proposed principles for flexible connections?

Question U: Are there other principles we should adopt?

11. FLEXIBLE CONNECTIONS ROADMAP

We foresee four stages of flexible connection activity beyond today's status quo. We expect that these steps will allow us to connect more customers efficiently, at higher voltages initially, with a proportionate impact on systems. This is a least regrets approach, phasing implementation based on anticipated complexity. We will be learning through practice as we expand the programme to lower voltages and more active connection management. Note that dates are indicative only.

- **Stage 0:** Today customers have a standard connection with a single value for each of MIC and MEC. The network is designed to accommodate all customers using their whole connection capacity at all times, according to the present design standards.
- **Stage 1:** Offer timed static flexible connections for import at EHV (33 kV) only, in areas that are most likely to become congested, based on available (not contracted) capacity – the probabilistic approach. This can be used for connecting new customers or moving existing customers to a flexible connection, including release of capacity.
- **Stage 2:** Offer timed, profiled and seasonal static flexible connections for import and export at EHV (33 kV) and HV (11 kV), and potentially LV, taking a probabilistic approach to capacity availability.
- **Stage 3:** Trial Active Network Management for dynamic flexible connections.
- **Stage 4:** Potentially, trial a capacity trading platform, through which customers might transact their exchange of capacity, and extend flexible connections to LV.



These stages are indicative proposals at this time and we expect the roadmap will be shaped by feedback from customers through this call for evidence. Progression will also be guided by experience and learning.

Question V: Do you have any comments on our draft flexible connections roadmap?

12. SYSTEM AND PROCESS IMPACTS

As part of our evaluation of flexible connection options, we have identified potential interactions and impacts on our own systems and external systems.

For NIE Networks system and process impacts include:

- Substantial increase in complexity of connections management processes, including network studies.
- Potential impact on connection offer timelines and costs/fees.
- Processes and systems for agreement/contract formation, issue and recording (SAP).
- Supplier interfaces (market messages, Central Design Authority).
- Network resilience monitoring.
- Compliance monitoring and exceedance charging.
- DSO systems, including DSO services (e.g. FLEX) contracting and operations.

There are also potential impacts on external (non-NIE Networks) systems and processes, and access to them for customers with a flexible connection:

- Supplier systems.
- TSO operations (BM, scheduling and dispatch).
- SEMO, SEMOpx wholesale market systems.
- SEMO capacity market systems.

- TSO DS3 System Services systems.

We plan to explore the impacts on all these dimensions in further detail.

Question W: Please let us know about any other systems which might be impacted by a connected customer having connection capacity which is not a single value.

13. PROPOSED NEXT STEPS

13.1 Next Steps

Given the analysis above, we propose the following next steps. We will:

- Consider in detail feedback from this call for evidence.
- Define priority areas (those more likely to become congested, which might be different for import and export capacity).
- Consult formally on more detailed proposals to enable flexible connections in congested areas, at certain voltages.
- Subject to proceeding with flexible connections, carefully monitor and evaluate their utility, value and effect on the network.

Question X: Do you agree with our proposed next steps? If not, please explain your thinking.

13.2 Responding to this Call for Evidence

We invite comments on the questions posed in this document, with a closing date of Friday 25th August 2023. A summary of the questions is included in Appendix A. Responses may preferably be submitted using the online form at www.nienetworks.co.uk/about-us/regulation/flexible-connections-call-for-evidence or alternatively emailed to Tim Cox – Tim.Cox@nienetworks.co.uk, with the words "Flexible Connections Consultation Response" in the subject field.

NIE Networks will handle all information in accordance with the NIE Networks Privacy Statement (www.nienetworks.co.uk/privacy).

Please note that it is intended to publish all responses to this paper on the NIE Networks website (www.nienetworks.co.uk). Respondents who wish that their response remains confidential should highlight this when submitting the response, with reasons.

NIE Networks may share responses with the Utility Regulator. Respondents should be aware that as the Utility Regulator is a public body and non-ministerial government department, the Utility Regulator is required to comply with the Freedom of Information Act[6].

[6] The effect of the Freedom of Information Act (FOIA) may be that information contained in consultation responses that is shared with UR is required to be put into the public domain. Hence it is possible that all responses made to this consultation that may be shared with UR will be discoverable under FOIA, even if respondents ask for the responses to be treated as confidential. It is therefore important that respondents take account of this and in particular, if asking that the responses are treated as confidential.

Appendix A SUMMARY OF QUESTIONS

Benefits of Flexible Connections

Question A: Do you agree with the anticipated benefits of flexible connections, as described above?

Question B: What other benefits do you identify?

Question C: What kinds of customers or assets might benefit from flexible connections?

Types of Flexible Connection

Question D: What form of flexible connection would be of most benefit to you? Why?

Question E: Are there any other forms of flexible connection that would be of value to customers?

Question F: Recognising that more granular resolution would mean greater complexity in systems, what resolution would be optimal for a flexible connection, and why?

Charging

Question G: Bearing in mind the increasing importance of customers not exceeding their contracted connection capacity, do you agree with the principle that customers should be incentivised not to exceed their MIC/MEC?

Question H: Do the present exception charges for MIC provide a suitable and sufficient incentive for customers not to exceed their MIC?

Question I: Do you agree in principle that an equivalent exception charging mechanism should be established for exceedance of MEC?

Question J: Would you advocate or be willing to install physical controls on site to reinforce adherence to MIC/MEC limits?

Question K: What approach to charging for MIC provides a meaningful incentive for customers to hold no more than sufficient capacity for their needs? Options: Charge for maximum MIC; charge for MIC in each period; some other approach – please describe?

Reducing Connection Capacity

Question L: Would customers seek to move to a flexible connection in order to reduce connection capacity in certain periods and therefore reduce total network charges?

Question M: Does the cost saving of moving to a flexible connection provide sufficient incentive for customers to release capacity?

Connection Capacity Market

Question N: Do customers think a market for connection capacity is, theoretically, a useful approach?

Question O: Do customers agree that a market for connection capacity is, in practice, unlikely to be a useful approach in the short to medium term?

Question P: Should a connection capacity market remain a consideration in the longer term?

Network Risk

Question Q: Which approach should we pursue: The ‘deterministic’ approach, where we keep total contracted capacity within the capacity of the network; or the ‘probabilistic’ approach, where we offer additional connections based on historic and forecast network flows?

Question R: Is there another approach we should explore?

Regulation and Standards

Question S: With regard to the regulatory framework do you agree that no changes are required in order to connect customers with flexible connections? If not, please explain.

Proposed Principles for Flexible Connections

Question T: Do you agree with these proposed principles for flexible connections?

Question U: Are there other principles we should adopt?

Flexible Connections Roadmap

Question V: Do you have any comments on our draft flexible connections roadmap?

System Impacts

Question W: Please let us know about any other systems which might be impacted by a connected customer having connection capacity which is not a single value.

Proposed Next Steps

Question X: Do you agree with our proposed next steps? If not, please explain your thinking.

Question Y: Please share any other comments.

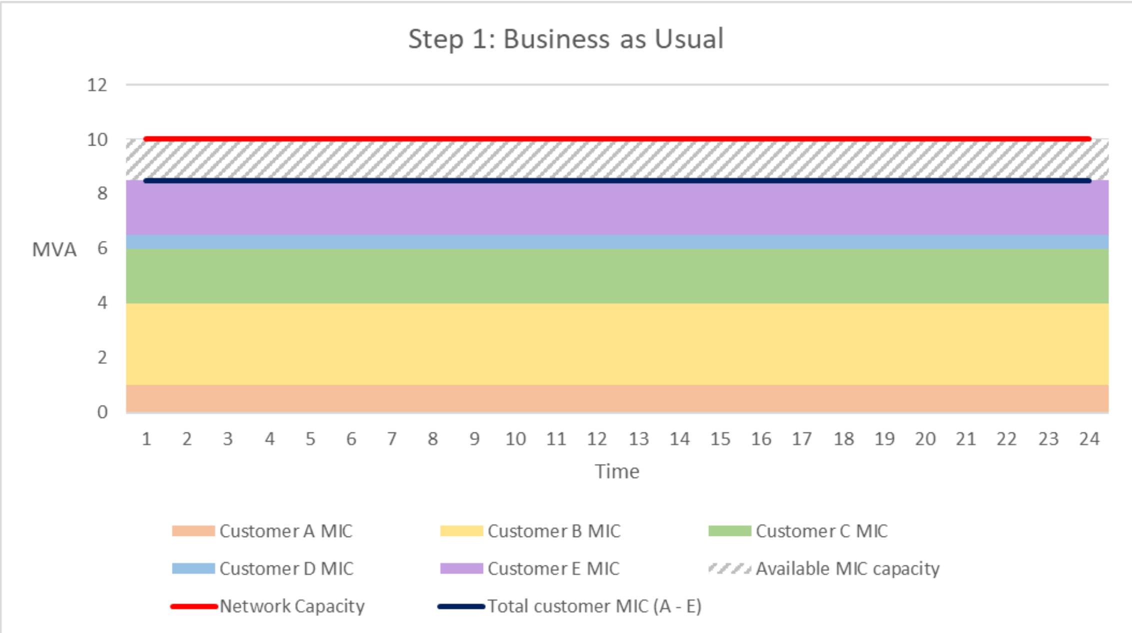
Appendix B EXAMPLE OF PROBABILISTIC APPROACH TO CONTRACTING MIC

Here we consider a simplified example of how capacity (MIC only) on a segment of the network is used over a notional 24-hour window. The 'flexible' part of the connection might be an MIC that varies across each day, or across the year.

Step 1: Business as Usual

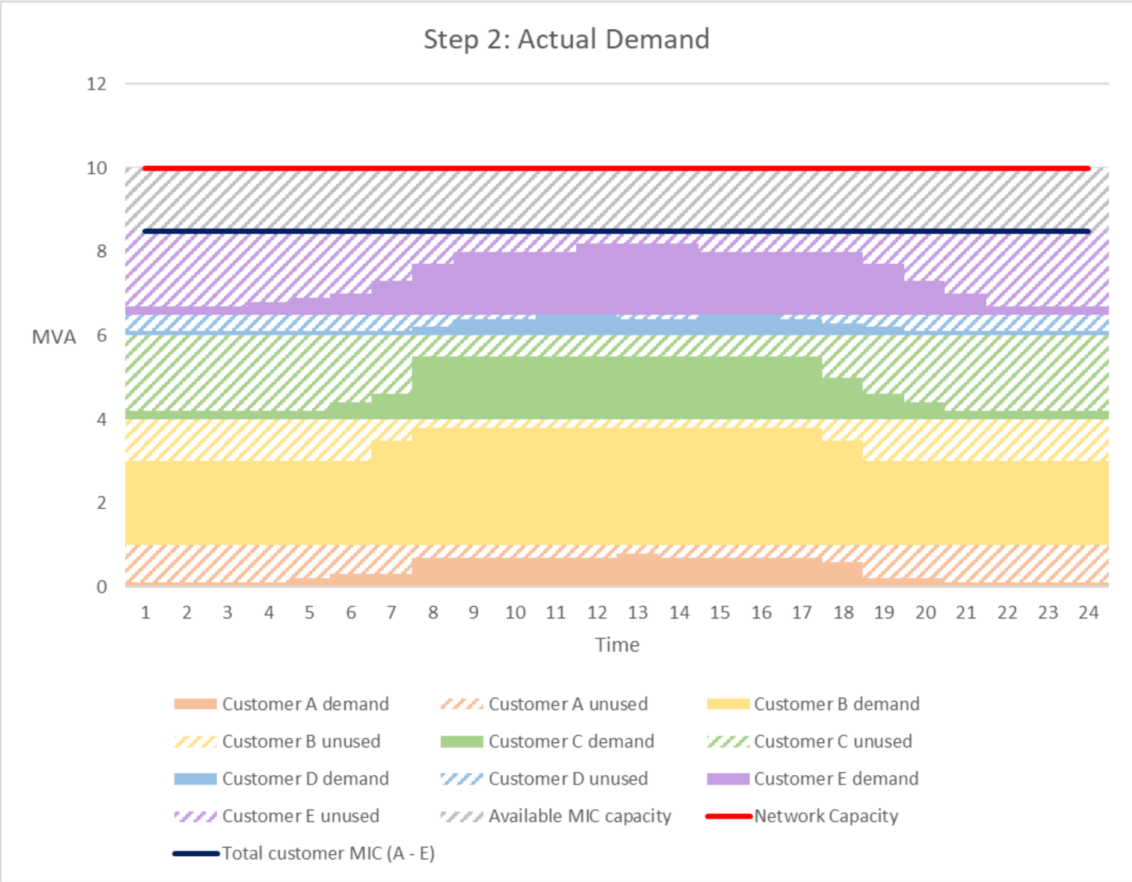
On a circuit with 10 MVA capacity, five customers, A to E, are connected and each holds a single MIC which does not change. We see their MIC holding on the graph below as a coloured band.

MICs are 1, 3, 2, 0.5, 2 MVA for customers A to E respectively, leaving 1.5 MVA MIC available. (The MICs are illustrative only.)



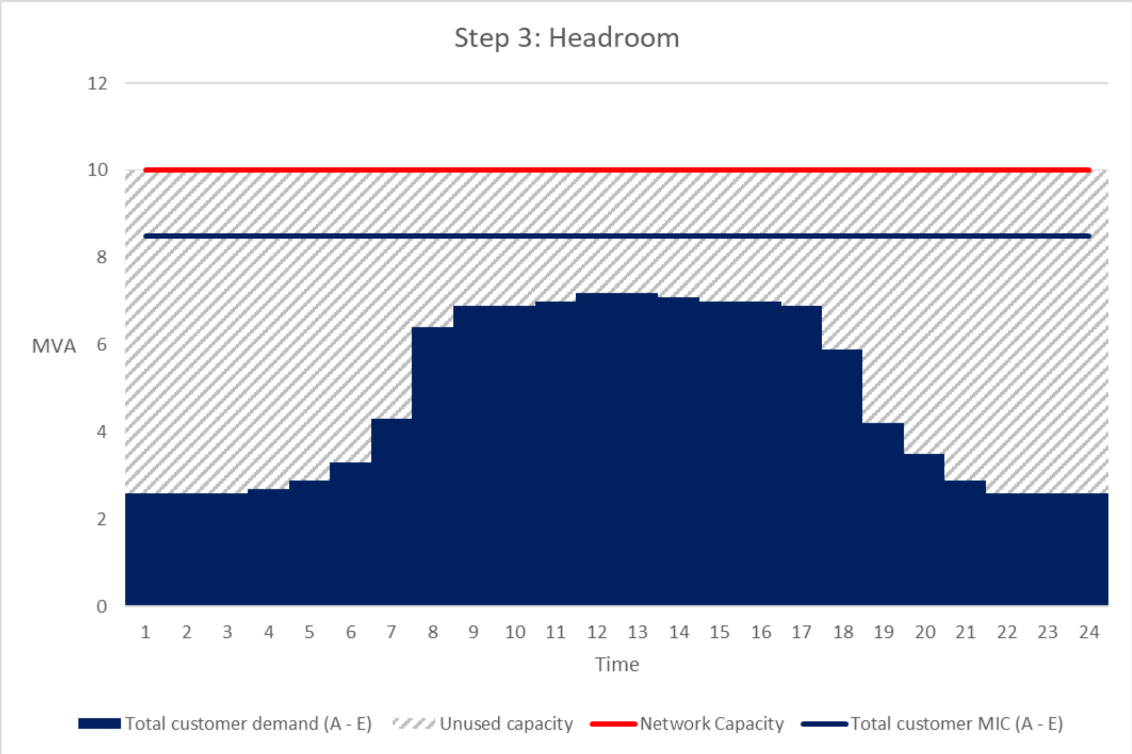
Step 2: Actual Demand

Here we show how customers are using their MIC – what demand they actually typically have. This actual demand is shown in the same bands as the previous graph. In this example, most existing connected customers are using most of their connection capacity in the working day.



Step 3: Headroom

Now we consolidate the demand from customers A to E and see what headroom is available.



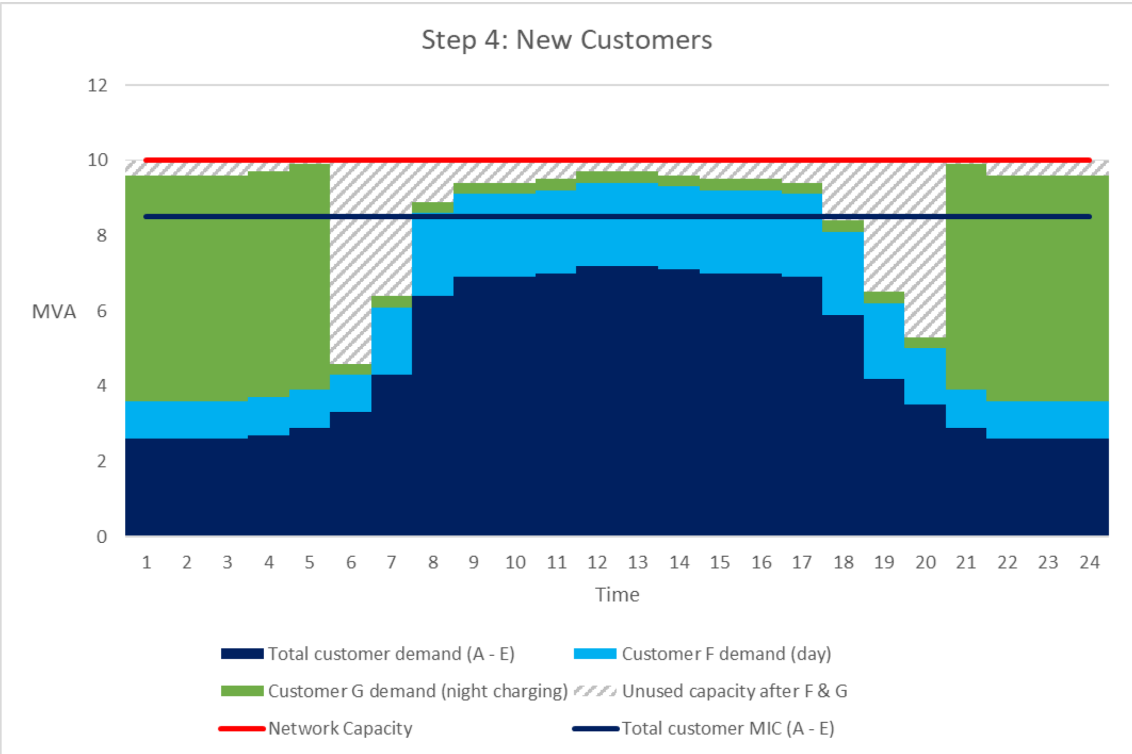
Step 4: New Customers

Two new customers want to connect.

- Customer F wants to connect 2.8 MVA of demand, highest in the working day, lower overnight.
- Customer G wants to charge a fleet of transport overnight, taking 6 MVA.

Under business as usual we cannot connect either of these customers without reinforcement, for which the customers would be charged, since there is insufficient spare capacity. But when we look at actual demand on this circuit we see that these new customers' demand can be accommodated.

So, we connect customers F and G with a contracted MIC that varies across the day. Customer F has higher MIC in the working day (7am to 8pm in this example), lower at night (8pm to 7am). Customer G has high MIC overnight, but very low in the day.



Step 5: Total contracted MICs

Now we plot the MIC holdings of all seven customers and we see we have contracted more MIC than we have capacity. We have done this because we know headroom is available above actual customer demand (step 4). Thus, we need to manage aggregated demand growth on this part of the network.